Date: Fri, 9 Sep 94 04:30:35 PDT
From: Ham-Homebrew Mailing List and Newsgroup <ham-homebrew@ucsd.edu>
Errors-To: Ham-Homebrew-Errors@UCSD.Edu
Reply-To: Ham-Homebrew@UCSD.Edu
Precedence: Bulk
Subject: Ham-Homebrew Digest V94 #268
To: Ham-Homebrew

Ham-Homebrew Digest   Fri, 9 Sep 94   Volume 94 : Issue 268

Today's Topics:

Date: 8 Sep 94 15:35:00 GMT
From: news-mail-gateway@ucsd.edu
Subject: 100MHz TTL Clock
To: ham-homebrew@ucsd.edu

in digest 267, Bill Kirkland writes:

>Can anyone tell where I can get a 100 MHz TTL clock (i.e. in
>quantities of 1/2).
>
>Bill Kirkland

If you just need a 100MHz pulse rate, you can use any of the
74Fxx or 74ALSxx series chips. They should have no problem

running at 100MHz. All you would need is the 100 MHz
crystal. You can use the 74ALS00 (quad nand gate) chip
and the 100MHz crystal as an oscillator.

Kevin

Legal stuff:
The above opinions are my own and not necessarily those of the staff,
faculty, administration, or lab animals (woof!) of The University of
Texas Health Science Center at San Antonio or anyone else who is not
me.


```
 ----------------------------------------------------------------------
Kevin R. Muenzler, WB5RUE           The University of Texas Health
muenzlerk@uthscsa.edu               Science Center at San Antonio,
                                   Department of Computing Resources

         ** There is no such thing as a Monkey-Proof Program! **
         **                I can prove it!                    **
 ----------------------------------------------------------------------
```

Date: 7 Sep 1994 23:44:46 GMT
From: newsflash.concordia.ca!canopus.cc.umanitoba.ca!silver.cs.umanitoba.ca!
rflukes@uunet.uu.net
Subject: Circuit Board Specialists of Pueblo, CO?
To: ham-homebrew@ucsd.edu

Does anyone know if Circuit Board Specialists of Pueblo, CO are
still in business? They used to make printed circuit boards for
many of the projects in QST magazine.

Thanks,
--Rich
--

```
Richard F. Lukes                    rflukes@silver.cs.UManitoba.CA
Computer Science Department
University of Manitoba              HOME: (204)-257-6701
Winnipeg, Manitoba  CANADA          WORK: (204)-474-8696
```

Date: Thu, 8 Sep 1994 03:44:47 GMT
From: ihnp4.ucsd.edu!swrinde!howland.reston.ans.net!swiss.ans.net!malgudi.oar.net!
utnetw.utoledo.edu!uoft02.utoledo.edu!POUELLE@network.ucsd.edu
Subject: need 100 MHz TTL clock

To: ham-homebrew@ucsd.edu

In article <34l4ru$icc@bmerha64.bnr.ca>, kirkland@bgtys22.bnr.ca (Bill Kirkland) writes:
>Can anyone tell where I can get a 100 MHz TTL clock (i.e. in
>quantities of 1/2).
>
>Bill Kirkland
>
100MHz TTL clock in quantities of 1/2 -

that woud be a 50MHz oscillator, or 2 25MHz ones :-)

Sorry, I couldn't resist!

Patrick
KB8PYM
pouelle@uoft02.utoledo.edu

Date: 7 Sep 1994 15:07:12 GMT
From: ihnp4.ucsd.edu!usc!howland.reston.ans.net!noc.near.net!hopscotch.ksr.com!jfw@network.ucsd.edu
Subject: Phase Locked Loops
To: ham-homebrew@ucsd.edu

dennis.mcguire@scpcug.com (Dennis Mcguire) writes:
> Can anyone tell me, in relatively simple terms, how a Phase Locked Loop
>circuit works?

A PLL contains four basic building blocks: a reference oscillator, a voltage-controlled oscillator, a phase detector, and a lowpass filter. The goal of a PLL is to make the VCO oscillate at the same frequency as, and in phase with, the reference oscillator. (Note that the reference oscillator is often not part of the PLL circuitry per se; for example, digital data clock recovery schemes, or "automatic frequency control" in your FM or TV receiver.)

There are several types of phase detector; I will describe how a PLL works when using a "phase-frequency detector", the easiest kind to design around but the hardest to understand the internals of (which isn't what you've asked for). A typical phase-frequency detector has two digital outputs, called U and D (for Up and Down), which are both high when everything is stable. If the PFD detects that the reference is at a higher frequency than the VCO, it will pulse the U output low every now and then (the exact pattern depending on the exact correlation between the two input signals); if it detects that the

reference frequency is lower than the VCO, it pulses the D output. Additionally, if the two frequencies are the same, but the reference is leading the VCO in phase (turns on first, turns off first, but at the same rate as the VCO), the PFD also pulses the U output low, and if the VCO leads, it pulses D low.

So, we now feed these two outputs into a circuit called a charge pump, which basically adds charge to, or subtracts charge from, a capacitor, according to the control signals; we now have a voltage that increases when U is low, decreases when D is low, and remains constant when both are high.

We pass this voltage through a low-pass filter (to remove the changes that happen at roughly the rate of the oscillator signals) to obtain a smooth "error voltage". This voltage is then fed to the Voltage-Controlled Oscillator to control its frequency (we might need a DC amplifier, depending on the range of output voltages the PFD/charge-pump gives us, and the necessary input range for the VCO).

```
--------          -------------  ------    --------    -------
| Ref. |__________| Phase/   U|--|Chg.|    |Low   |    |     |
| Osc. |          | Freq      |  |pump|----|Pass  |----| VCO |--------- output
--------      ____| Detector D|--|    |    |Filter|    |     |    |
             |    -------------  ------    --------    -------    |
             |                                                    |
             |____________________________________________________|
```

(Note that the Charge Pump is usually integrated either with the phase detector or with the low-pass filter, depending on the ICs you're using, and that other types of phase detectors don't use a charge pump as such. That's why you see five boxes there when I promised that there were only four major building blocks. :-)

To review how it all works together: assume that the reference and VCO are on different frequencies. The phase detector and lowpass filter causes the control voltage to increase or decrease, as appropriate, to bring the VCO to the right frequency. Once the frequency is right, if the VCO is lagging in phase the voltage is nudged a bit higher to speed it up and bring it into phase lock (note that the voltage will subsquently be nudged lower to fix the frequency!), and vice versa for leading phase. Once the VCO is locked in, it may drift a bit in phase, but will be nudged back by the feedback loop.

So there you have a basic PLL, a voltage-controlled oscillator that follows exactly the frequency and phase of another oscillator.

Why would you want to do that, when you already HAD an oscillator? As

I said, one common type of use of PLLs is when the reference oscillator isn't part of the actual circuit; you can use a PLL to track the frequency of an oscillator that is somewhere else, and (especially important) is noisy or has been heavily modulated: you can turn an FM radio signal into a local pure copy of the original carrier by ensuring that the PLL low-pass filter removes all traces of audio signals; thus, the VCO won't keep up with the frequency changes inherent in FM, and instead follows the center frequency of the signal.

Another use of PLLs is in frequency synthesizers: you can make a stable high-frequency oscillator (or, more importantly, stabilize an unstable high- frequency oscillator) by starting with a stable low-frequency oscillator at some sub-multiple of the desired operating frequency (a tenth, a hundredth, or (say) one part in four thousand six hundred twenty three), and inserting a divider between the VCO and the phase detector to divide the VCO frequency down to the range of the reference. If the divider is programmable, you can change the output frequency by changing the division ratio (say, from 4623 to 4624); this is how channelized frequency synthesizers usually work.

Another form of frequency synthesis can give you a continuously variable output frequency: instead of a fixed very-low frequency oscillator, you make a variable frequency oscillator at some easy-to-stabilize frequency (perhaps 3.0 - 4.0 MHz), and instead of a frequency divider, you put a frequency mixer between the VCO and the phase detector; the second input to the frequency mixer would be a high-stability crystal oscillator operating roughly 3MHz away from the desired output frequency. If the crystal oscillator runs at 150MHz and the VFO is at 3 MHz, the VCO could be at either 153 or 147MHz; tuning the VFO to 4MHz would then lock the VCO at either 154 or 146MHz. You could use a direct mixing scheme to obtain this result (feed the VFO and 150MHz XO into a mixer), but filtering out a 146MHz signal while leaving a 154MHz signal intact (or vice versa) is somewhat difficult (since the percentage difference isn't very high); on the other hand, you can design a VCO that will reach from 146 to 147MHz but *cannot* tune as high as 153MHz, which means the VCO will lock onto the correct frequency and there is no spur to reject.

You can also make frequency synthesizers that combine the two tricks above in almost arbitrary combinations.

Date: 8 Sep 1994 00:25:44 GMT
From: ihnp4.ucsd.edu!swrinde!gatech!usenet.ins.cwru.edu!po.cwru.edu!
sct@network.ucsd.edu
Subject: Phase Locked Loops

To: ham-homebrew@ucsd.edu

In article <94090513254820@scpcug.com>,
Dennis Mcguire <dennis.mcguire@scpcug.com> wrote:
> Can anyone tell me, in relatively simple terms, how a Phase Locked Loop
> circuit works?

The idea is to compare two signals to each other, using the output of the comparison to alter one of the signals. The effect is to narrow the phase difference between the two until they are "locked" to each other.

A simple but useful loop looks like this:

```
    Dirty signal ------ Phase Comp ------ LPF ------ VCO ---+------
                            |                               |
                            +-------------------------------+
```

The phase comparator compares the two signals and outputs an indication of the phase difference between them. The Low Pass Filter passes just the DC and near-DC components of the comparator's output to the VCO. The result is that after some settling time, the loop exactly matches the VCO frequency and phase to the input signal. This kind of loop might be used to filter DDS output or some other harmonic-laden signal.

If you tapped the output of the LPF, you'd find that this loop makes a good FSK or FM demodulator. The LPF control of the VCO is much like the microphone controlling a VCO in the transmitter, so in effect you're locking the receiver's VCO to the transmitter's and recreating the voice or data signal necessary to keep the lock.

To see a different application, add a divider to the loop, like this:

```
    Input signal ------ Phase Comp ------ LPF ------ VCO ---+------
                            |                               |
                            +------------ Divide -----------+
```

This gives you a wonderful thing -- an arbitrary frequency multiplier! Suppose the input signal is a 100 KHz crystal-controlled oscillator and the divider divides by 16. That means the phase comparator sees two 100 KHz locked signals only if the VCO is running at 1.6 MHz. Make the divider programmable and you can generate any multiple of 100 KHz reachable by the VCO.

To see what makes this really useful, suppose the input signal was 100 Hz, and make the divider divide by 71100. Then you'd have the VCO running at a nice 7.110 MHz, smack in the middle of the 40m novice band. Make the division ratio change under the control of a knob, and you have a "synthesized" VFO for a 40m rig!

These are simplistic PLLs. There are many variations for better
performance or special functions. A PLL can be built to lock onto
a harmonic of its input signal, or it can do frequency translation
sort of like a mixer but without an extra sideband. Several PLLs
can be nested to get extra tuning resolution or greater stability.
PLLs can do lots of varieties of demodulation and some kinds of
modulation.

IMHO, a lot of magic is in the phase comparator. A phase comparator
may be as simple as a double-balanced mixer or an XOR gate, but many
are more complicated. A typical design might have several flip-flops
controlling three or more states on the output.

Weak points of PLLs: They always have some phase noise. They take time
to settle to a new frequency. Many are limited to one octave or less in
tuning. There's a tradeoff between speed of tuning and tuning resolution,
partially solved by more complex dual-modulus dividers. The dividers
need to be fast (ECL is sometimes needed) and introduce digital noise
into what might be otherwise a quiet analog system. Finally, PLL analysis
is well understood but notoriously heavy on math.

Stephen

--
Stephen Trier   "Even if I wanted to practice my horn, it's at
sct@po.cwru.edu   the bottom of the bathroom."
KG8IH   - Dan Alt, hornist, during the Cleveland
                    Youth Wind Symphony European tour 1994

Date: Thu, 8 Sep 1994 03:38:05 GMT
From: ihnp4.ucsd.edu!swrinde!howland.reston.ans.net!swiss.ans.net!malgudi.oar.net!
utnetw.utoledo.edu!uoft02.utoledo.edu!POUELLE@network.ucsd.edu
Subject: Ramsey 2m Amplifier Brick kit
To: ham-homebrew@ucsd.edu

In article <34ijgm$3ak@sandra.teleport.com>, genew@teleport.com (Gene Wolford)
writes:
>pouelle@uoft02.utoledo.edu wrote:
>: In article <Cv5E0I.6xL@fore.com>, ed@fore.com (Ed Bathgate) writes:
>: >
>: >I am thinking of getting the Ramsey 2M Brick amp kit and the matching
>: >tx relay.
>: >
>: >Any experiences / opinions with this unit.
>: >

>: > 73
>: >
>: > Ed N3SDO
>: > Ed@fore.com
>: Ed,
>: I recently built the Ramsey 2m PA-1 and relay. The amp seems to work
>: fine. [SNIP]

>I opted to buy the completed unit. I added up the prices of the amp kit, the
>relay kit, heat sink, and additional assorted hardware and came up with a
>cost just short of the finished and tested unit.
>
>BTW, if you buy the complete unit, you will find that Ramsey does not use a
>relay at all! There is a 1/4 (?) wave piece of coax feeding the received
>signal back around the amp. At the opposite end of the coax from the power
>amp output is a PIN diode which conducts when the amp outputs. This shorts
>the end of the coax, presenting an apparent open circuit at the amp end of
>the coax. Instant switching, works fine on packet.
>
>The only downside to this amp is due to it's being a single transitor
>output. It is therefore biased ON in the middle of it's range, (let's see,
>is that called CLASS A ?). The result is that the amp draws 4+ amps at all
>times. For this reason I don't use it mobile. I occasionally forget and
>leave my mobile amp on, I use one which only draws significant current
>when I talk, thus not running the darn battery down.
>
>73's
>Gene
>KB7WIP
Gene,
The kit is class C if you don't modify it - draws almost no current unless
you are transmitting and is great as a mobile amp for the HT.

You didn't happen to record the PIN diode's part number did you? I'm
interested in eliminating the relay and going to a PIN diode switch.

73
Patrick
KB8PYM
pouelle@uoft02.utoledo.edu

Date: Wed, 7 Sep 1994 16:17:12 GMT
From: ihnp4.ucsd.edu!swrinde!emory!nntp.msstate.edu!saimiri.primate.wisc.edu!aplcenmp!joses-mac.jhuapl.edu!user@network.ucsd.edu
Subject: Stainless Steel Hardware 18-8 vs 316
To: ham-homebrew@ucsd.edu

In article <34k95r$5s5@search01.news.aol.com>,
jimn0oct@aol.com (JimN0OCT) wrote:

> In article <1994Sep6.140334.33747@leo.bsuvc.bsu.edu>,
>   00tlzivney@bsuvc.bsu.edu (Terry L. Zivney) writes:
>
> >Can anyone tell me what the difference is between
> >18-8 Stainless and 316 Stainless? The fastener supplier caRRies two
> >types of stainless bolts - which is stronger? Any other differences?
>
> Probably won't make much difference. 304 stainless WILL rust, and any
> stainless is not truly compatible with copper. Unless you have a high
> stress application, I would think either will do.
>

FWIW, I believe 316 SS is very nearly nonmagnetic, but 18-8 is magnetic.

--
Marshall Jose, WA3VPZ
josemj1@aplmail.jhuapl.edu

Date: Wed, 7 Sep 1994 16:53:12 GMT
From: ihnp4.ucsd.edu!usc!nic-nac.CSU.net!charnel.ecst.csuchico.edu!yeshua.marcam.com!news.kei.com!ub!freenet.buffalo.edu!aa450@network.ucsd.edu
Subject: Stainless Steel Hardware 18-8 vs 316
To: ham-homebrew@ucsd.edu

In a previous article, 00tlzivney@bsuvc.bsu.edu (Terry L. Zivney) says:
>
>Can anyone tell me what the difference is between
>18-8 Stainless and 316 Stainless? The fastener supplier caRRies two
>types of stainless bolts - which is stronger? Any other differences?
>
>Terry Zivney, N4TZ
>00tlzivney@bsuvc.bsu.edu
>

The designation 18-8 specified only the chromium/nickel content and is, by todays standards old and outdated. The modern 316 is also 18-8 with a more detailed specification of the minor elements. There is also a 316L which is made to be more suited to welding. So, for non-critical applications (antenna hardware) they are the same.

Kurt, n2tte

--

Date: 8 Sep 1994 10:24:05 -0400
From: newstf01.cr1.aol.com!search01.news.aol.com!not-for-mail@uunet.uu.net
Subject: Turns Counter-Bauman Sales
To: ham-homebrew@ucsd.edu

I am trying to find a source for the "Groth" type turns counters. I got one from Bauman Sales in Itasca, Ill. a few years ago but the no longer appear to be in business. Any Ideas??
Tnx Russ, WA6CWV, Boise

Date: 8 Sep 94 16:14:57 GMT
From: ihnp4.ucsd.edu!usc!howland.reston.ans.net!vixen.cso.uiuc.edu!aries!hawley@network.ucsd.edu
Subject: Turns Counter-Bauman Sales
To: ham-homebrew@ucsd.edu

ells22@aol.com (ELLS22) writes:

>I am trying to find a source for the "Groth" type turns counters. I got
>one from Bauman Sales in Itasca, Ill. a few years ago but the no longer
>appear to be in business. Any Ideas??
>Tnx Russ, WA6CWV, Boise
A couple of months ago he (Bauman) was still there. Did u try info for Bauman personal phone #?

Chuck Hawley, KE9UW

Date: 8 Sep 1994 03:00:36 -0600
From: mnemosyne.cs.du.edu!nyx10.cs.du.edu!not-for-mail@uunet.uu.net
Subject: WANTED
To: ham-homebrew@ucsd.edu

I was wondering if anybody could tell me how to build an INEXPENSIVE 2Meter to 10GHz Transverter and a 10GHz Antenna?   Thanx...

Steve
KB0OLF

Date: Wed, 07 Sep 1994 18:41:30 -0400

From: niven.ksc.nasa.gov!algol.ksc.nasa.gov!k4dii.ksc.nasa.gov!user@ames.arpa
To: ham-homebrew@ucsd.edu

References <pelt-0109941312410001@box185.ams.vt.edu>,
<acooneyCvKIBK.KHs@netcom.com>, <778715151snz@arkas.demon.co.uk>(
Subject : Re: Circuit Bd Software for Macs

In article <778715151snz@arkas.demon.co.uk>, Michael@arkas.demon.co.uk wrote:
> do Mac's have a feature that equals the processing power of an intel floating
> point processor?

Mike-

As someone else pointed out, the answer to this question may depend on who you ask! Certainly FPUs can be added to many Macs that don't have them.

The issue, as I see it, is that many software companies won't write engineering software for Macs, regardless of how good they are. I think that if Macs were 49% of the market, with MS-DOS/Windows at 51%, nothing would change. Companies concentrate their efforts to maximize profit, as if they were responding to a simple, single-minded computer program. "Better" doesn't count. "More" counts.

73, Fred, K4DII

End of Ham-Homebrew Digest V94 #268
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